FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy

Office of Nuclear Energy

Energy Innovation Hub –
Modeling and Simulation for Nuclear Reactors

Funding Opportunity Number: DE-FOA-0000170

Announcement Type: Initial

FOA Issue Date: January 20, 2010

Letter of Intent Due Date: not applicable

Pre-Application Due Date: February 1, 2010 at 11:59 PM Eastern Time

Application Due Date: March 1, 2010 at 8:00 PM Eastern Time

CFDA Number: 81.121 – Nuclear Energy Research, Development and Demonstration

This Announcement will remain open until the Application Due Date indicated above however, applications may be submitted any time before this Announcement closes.

It is also recommended that application submission begin well in advance (at least 48 hours) of the Announcement closing.

NOTE: Applications in response to this FOA must be submitted through Grants.gov.

NOTE: REGISTRATION/SUBMISSION REQUIREMENTS

Registration Requirements

There are several one-time actions you must complete in order to submit an application in response to this Announcement: 1) obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, 2) register with the Central Contractor Registration (CCR), 3) register with Grants.gov, and 4) register with FedConnect. If not previously registered, applicants should allow at least 10 business days to complete these requirements. Applicants should begin the process as soon as possible.

Applicants must obtain a DUNS number. Instructions can be found at:

http://fedgov.dnb.com/webform

Applicants must register with the CCR. The CCR website is:

http://www.ccr.gov/

Applicants must register with Grants.gov to submit their application. The Grants.gov website is: http://www.grants.gov/

Application Preparation and Submission

Applicants must download the application package, application forms and instructions, from Grants.gov. Applicants must submit their application through Grants.gov. Additional instructions are provided in Section IV, A and I of this FOA.

http://www.Grants.gov

Applicants must register with FedConnect. The FedConnect website is:

https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf

Questions

Questions relating to the Grants.gov **registration process, system requirements, how an application form works** or submission of applications through Grants.gov must be directed to Grants.gov at 1-800-518-4726 or **support@grants.gov**.

Questions regarding the **content** of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. More information is available at **http://www.compusearch.com/products/fedconnect/fedconnect.asp**.

Questions pertaining to the FedConnect registration process should be directed by e-mail to support@FedConnect.net or by phone to FedConnect Support at 800-899-6665.

TABLE OF CONTENTS

Section I - FUNDING OPPORTUNITY DESCRIPTION

A. SUMMARY

The Department of Energy will launch three Energy Innovation Hubs in FY2010—one in each of the focus areas listed below:

1. Fuels from Sunlight,
2. Energy Efficient Building Systems Design, and
3. Modeling and Simulation for Nuclear Reactors.

The Secretary of Energy has identified the problems in these topic areas as presenting the most critical barriers to achieving national energy and climate goals while having proven resistant to solution by conventional R&D enterprise structures. In a new R&D structure modeled on the Department's successful Bioenergy Research Centers, each Hub will comprise a highly collaborative team, spanning multiple scientific, engineering, and where appropriate, economics, and public-policy disciplines. By bringing together top talent across the full spectrum of R&D performers—including universities, private industry, non-profits, and National Laboratories—each Hub is expected to become a world-leading R&D center in its topical area.

The Hubs will seek to rapidly drive energy solutions to their fundamental limits. Each Hub will support cross-disciplinary R&D focused on the barriers to transforming its energy technologies into commercially deployable materials, devices, and systems. The ultimate goal of each will be to advance a highly promising area of energy science and technology to the point that the risk level will be low enough for industry to deploy solutions into the marketplace.

The Hubs will foster unique scientific collaboration that will be critical to success, and must be backed by a meaningful and sustained investment. The award period is for five years. Each Hub will be funded at a total of $22 million in FY 2010, with up to $10 million of those funds to be devoted to infrastructure start-up for the Hub, including building renovation (but no new construction), lease arrangements, equipment, and instrumentation. DOE anticipates that each Hub established in FY 2010 will be funded at $25 million per year for Hub operations in the final four years (FY 2011 – FY 2014) of the award period, pending Congressional appropriations.

Funding will be competitively awarded to Hubs selected on the basis of external peer-review of proposals as detailed in this Funding Opportunity Announcement (FOA). Hub progress and renewal requests will be monitored by an Oversight Board established by the Secretary, acting upon recommendations of DOE staff and external reviewers.

B. STATUTORY AUTHORITY

Public Law 95-91, U.S. Department of Energy Organization Act

Public Law 109-58, Energy Policy Act of 2005

C. APPLICABLE REGULATIONS

U.S. Department of Energy Financial Assistance Rules, codified at 10 CFR Part 600

U.S. Department of Energy Technology Investment Agreement Rules, 10 CFR Part 603

D. BACKGROUND

The critical challenges that our Nation faces in the 21st Century to its energy, environmental, and economic security are urgent and deeply intertwined. The Department of Energy supports the President's goals of providing for our Nation's energy security, growing our economy, and

reducing green house gas emissions through the creation of a new energy economy founded on significant changes in the ways we produce and consume energy. These challenges will not be met solely by incremental improvements to existing technologies. Achieving these goals will require transformational technologies that provide clean, reliable, economic energy solutions that are sustainable in the long term.

Orchestrating rapid, transformative changes to the energy system portfolio represents a technological challenge of historic scale. Success will require major national mobilization of basic and applied energy research capabilities, accompanied by commensurate investments in engineering and development necessary to accelerate the deployment of revolutionary energy technologies. Early and close coordination with the private sector to facilitate transition to deployment is also essential. The development of the atomic bomb under the Manhattan Project and of radar technology at the MIT Radiation Laboratory during World War II, and the invention of the transistor at Bell Laboratories in the 1950s, stand as proof that exceptionally rapid technological breakthroughs are possible. A hallmark of these research efforts was the focus of highly collaborative fundamental research and technology development capabilities of unrivaled quality and significant scale on a specific technological challenge.

The leaders of these efforts – scientists themselves – understood the necessity of close-quarters give-and-take between those involved in fundamental research and technology development. The paths of scientific discovery and technological need to inform each other: Advances in basic sciences create entirely new technology possibilities; likewise, technology development efforts identify key roadblocks that require improved scientific understanding or wholly new approaches. Connecting fundamental research and technology development through an integrated team was essential to these rapid achievements.

The Energy Innovation Hubs embrace this centrally led “integrated” model of research towards a challenge goal. The Department recognizes that there is a need for bold and innovative approaches that better couple all elements of the Nation’s innovation system and combine the talents of universities, national labs, and the private sector in concerted efforts to define and construct a sustainable energy economy.

The purpose of the Energy Innovation Hubs will be to assemble the most talented scientists and technologists to focus intense research and development efforts on the critical areas listed above. The Hubs are designed to accelerate the current state-of-the art energy science and technology toward their fundamental limits and support high-risk, high-reward research projects that produce revolutionary changes in how we produce and use energy. Ideally, each Hub will have a central location housing many investigators, who will likely span multiple disciplines. Each Hub may be led by universities, private for-profit or non-profit firms, or government laboratories.

Each Hub research focus area was selected based on the following considerations:

- The focus area problem represents a significant grand challenge, with advances that are likely to have a major impact on energy production or usage, greenhouse gas emissions, and economic growth.
- Although the scientific community may have addressed the focus area problem for decades through research at the individual-investigator or group level, what is needed today is a large-scale coordinated, multidisciplinary, systems-level approach that matches the complexity of the technical issues of efficiency, manufacturability, deployment, and utilization.

Additional illustrations that provide potential models for the successful management and operation of a Hub can be found on the Energy Innovation Hubs website: http://www.hubs.energy.gov/ . These include not only current examples of collaboration between industry and practitioners of basic and applied R&D in both academia and national laboratories, but also historical lessons from previous successful R&D centers. These examples highlight the critical role of great scientific leadership in the acceleration of progress, and that integration of

foundational science and concentrated engineering efforts can have tremendous long-term impact on science and technology well beyond the mission of the center.

E. HUB DEVELOPMENT REQUIREMENTS

Overview

The Energy Innovation Hubs will take a holistic, systems approach to science and technology and will act as an integrator of basic and applied research and development. The scientific problems to be addressed by the Hub are inherently interdisciplinary. The Hub will require personnel with varied skills and expertise in areas that may include physics, chemistry, materials science, biology, and engineering, among other possible areas.

In addition, it will be critical for the Hub's research team to understand in depth the potential roadblocks and bottlenecks that must be overcome in order to implement a sustainable and commercially viable technology. The Hub will need to combine exceptional skill and creativity in general energy technology research with cutting-edge expertise in the specific problems to be addressed, either by including researchers specializing in this field or developing strong partnerships and working relationships with the individuals and institutions, governmental and nongovernmental, that have been engaged in research on these or related problems. The Hub is also expected to develop enabling technologies to facilitate and accelerate this research.

The Hub is expected to foster and encourage robust interaction with private industry to accelerate technological innovation and reduce the barriers to movement of new technologies to the marketplace. The Hub will support additional analysis and practical efforts aimed at understanding and achieving technology transfer and eventual large-scale commercialization and deployment of cost-effective technologies, including addressing the environmental, economic, and infrastructural dimensions of this challenge.

Infrastructure and Operation

Strategies for development of the Hub may include renovation of existing buildings and leasing buildings. The Hub will be funded at a total of $22 million in FY 2010 and up to $10 million of this total may be devoted to infrastructure start-up for the Hub. Allowable costs include those necessary to house the Hub (including a possible lease for the first five years of the project), to renovate laboratories as needed, and to purchase research equipment and instrumentation. No new construction (new buildings or additions to existing buildings) will be allowed in the Hub award.

The Hub may develop agreements with respect to access to major scientific instrumentation, including DOE user facilities, on an as-needed basis rather than as an integral component of the initial Hub request and budget since funding at DOE user facilities is determined and administered separately from this announcement.

.

Technical Capabilities and Instrumentation

The Hub will need to include all technical capabilities the applicant considers necessary to implement their proposed approach, including experimental and computational tools. In order to carry out the proposed research program, the Hub will be expected to develop core capabilities in or have access to the full range of synthetic, characterization, manipulation, and computational capabilities. A portion of the research at the Hub may be devoted to developing new technological capabilities for overcoming challenges that cannot be addressed with currently available technologies and instrumentation. Research capabilities and resources to be accessed outside of the Hub should be clearly identified.

Management

The Department recognizes that effective management of scientific facilities, programs, and projects is critical to the success of research. The Hub must have well-designed management plans for the establishment of the Hub as well as for Hub operations. Plans should include provisions for coordination with other basic and applied research and development activities supported by the Department. The Hub's management structure must enable empowered scientist-managers to execute quick decisions to shape the course of research. Management of the Hub's initial establishment, research, technology development, resources (both personnel and physical resources), and scientific data are critical to the success of the Hub, to its overall contribution to the Energy Innovation Hubs initiative and Department's missions. In addition, each Hub must have an advisory board that includes industry participation.

Key elements for the successful management of a Hub include:

- a clear lead institution with strong scientific leadership and central location for the Hub;
- to the extent that there is geographic distribution of the Hub participants, a clear commitment to the use of state-of-the-art technology and frequent virtual meetings to enable meaningful long distance collaboration; and most importantly
- a clear organization and management plan for achieving the collaborative and synergistic goals of a Hub and "infusing" a culture of empowered central research management throughout the Hub.

The Hub will be subject to regular and rigorous peer review of their scientific program and their management structure, policies, and practices. Within DOE, there will be an Energy Innovation Hubs Oversight Board that will periodically review the progress of the Hubs Each Hub will coordinate with a particular department program office, which will be responsible monitoring Hub activities and conducting annual site visit reviews (as necessary) of the Hub.

Staffing

The research program of the Hub should be led by internationally-recognized scientists. A Hub may be composed of diverse institutions including national laboratories, academia and non-profit research institutes, and the private sector. In assembling its research team, the Hub should strive to achieve the synergies that arise when individuals with forefront expertise in different methodologies, technologies, disciplines, and areas of content knowledge tackle a problem together, overcoming impasses by attacking the issue from fresh angles and discovering novel solutions.

Quality Assurance and Information Management

Applicants will be expected to have sound quality assurance plans for all aspects of the Hub proposed programs. National and international standards for quality assurance for the different categories of experimentation to be carried out in the Hub should be identified and plans for qualifying for International Organization for Standardization (ISO) and other certifications should be described in the application as appropriate.

Deliverables / Benchmarks

The work of the Hub will span from basic research to engineering development to an eventual transition to industrial development. The Hub will support cross-disciplinary research and development focused on the barriers to transforming energy technologies into commercially deployable materials, devices, and systems. They will advance highly promising areas of energy science and technology from their early stages of research to the point that the risk level will be low enough for industry to deploy them into the marketplace. As such, all of the Energy

Innovation Hubs are expected to have deliverables or benchmarks that help focus the objectives of the research to the proposed short, intermediate, and long term goals they are addressing.

Training and Outreach

The Hub should include educational/training programs for students, postdoctoral fellows, and scientists. On-site scientific staff as well as visiting researchers should be included in proposed, regularly available programs. Outreach activities in which the Hub interacts with the public in educational activities are also encouraged, but not required.

Research Integration and Coordination

Applicants should describe plans for integrating the results of their fundamental research and technology development with other basic and applied research and development activities supported by the Department, including the work conducted at the other Energy Innovation Hubs. The Hub may require research and technology capabilities that are beyond the scope of the Hub's skills and resources; if so, the application should demonstrate plans for obtaining these additional capabilities, including collaboration with outside scientists.

Collaboration with Industry

The Hub is expected to foster and encourage robust interaction with private industry beyond the scope of R&D directly funded through this FOA. The interactions should aim at accelerating technological innovation and reducing the barriers to movement of new technologies to the marketplace. Examples of this type of activity include (but are not limited to) industry-sponsored research partnerships, research personnel exchanges, industry-sponsored post-doctoral or graduate fellowships, and industry-sponsored seminars and conferences. Applicants are encouraged to provide information regarding their plans to create a research environment that promotes collaboration with industry to enable organizational cognizance of industry readiness, technology transfer, and eventual market penetration.

Other considerations

While capital investment in instrumentation and start-up needs are expected as part of the Hub awards, usage and leverage of existing facilities, including the Department's user facilities, is encouraged. DOE user facilities, including light sources, neutron scattering sources, nanoscale science research centers, advanced computational facilities, and other specialized user facilities, are considered foundational resources for a vast range of the scientific user community. As such, they are expected to serve as independent resources for the Hub funded under this announcement. Funding for activities at these DOE user facilities is determined and administered separately from this announcement and should not be included in the budget requests of applications to this announcement.

F. RESEARCH FOCUS: NUCLEAR ENERGY MODELING AND SIMULATION

Nuclear energy is a technology that provides energy to the United States (U.S.) that is safe, secure, affordable, and environmentally sustainable. Advanced nuclear technologies also represent a future energy source that can provide power, process heat, and hydrogen for a range of industrial applications to expand the U.S. economy. However, there are some technical challenges for these more advanced reactor technologies that must be addressed before the designs can be licensed and deployed. Traditionally, creating the scientific knowledge to prove the safety and licensing bases of advanced technologies relied heavily on testing and demonstrating prototype reactors. While this approach has been very successful, it has been proven to take a long time and to be very expensive.

Over the past decade and a half, a new capability has been added to theory and experimenting to create and demonstrate scientific insight about complex physical systems. With the advent of very high-powered computing, advanced modeling and simulation can provide faster and more detailed insights into the operation of physical systems. These modeling and simulation capabilities are based on first scientific principals and provide full-dimensional and high-resolution results that accurately simulate a diverse range of operating conditions and system responses.

The Office of Nuclear Energy (NE) is currently investing in development of these capabilities with our national laboratory and university partners. But building and validating the new tools will take time as new reactor technologies develop and evolve. However, advanced modeling and simulation capabilities exist and can be applied to current reactor design issues (e.g. life extensions and power uprates for current reactors; note that these are cited as examples only - as such, they should not be taken as “requirements” and are not intended to preclude other topics at the discretion of the applicant).

The Modeling and Simulation Hub will utilize those existing advanced modeling and simulation capabilities (e.g. computational fluid dynamics) developed by the Department of Energy’s (DOE) Office of Science, National Nuclear Security Administration (NNSA) and other DOE research and development activities and programs. The Hub will then apply them through a new multi-physics computational capability that will provide predictive capability for life extension and power uprates calculations. The Hub will also provide the opportunity (at the discretion of the applicants) to develop new, system focused modeling and simulation capabilities that will become part of the engineering environment for nuclear energy technology issues.

Part of the challenge will be to adapt these advanced computational tools into the current and future culture of nuclear engineers. The modern, science-based simulation tools are designed to be used by specialists. After five years, the Hub is intended to produce a multi-physics computational environment that can be used by a wide range of practitioners to conduct predictive calculations of the performance of reactors in the future for both normal and off-normal conditions.

An important element of the Modeling and Simulation Hub is to have a clear mission that will focus and drive research and development. The mission focus of the Hub is to apply existing and/or newly developed modeling and simulation capabilities to create a user environment that allows engineers to simulate an operating reactor, as chosen by the applicant that will act as a "virtual model" of that reactor. The Hub also will obtain data from the “real physical” reactor that will validate the "virtual model." The Hub’s virtual model will be validated by “real physical” reactor data obtained from at least one reactor, either operating or previously operated. In turn, engineers will use the "virtual model" to address important questions about the operations of and safety basis for the reactor(s), such as can the reactor(s) be uprated in power and operate safely for an extended period of time. Finally, the combination of the "virtual model" and the physical reactor(s) will be used to communicate the potential role of science-based modeling and simulation to address technology issues concerning nuclear energy in the near, mid, and long terms.

G. DEFINITION OF TERMS

This information is primarily derived from the article, Energy-Technology Innovation, by Kelly Sims Gallagher, John P. Holdren, and Ambuj D. Sagar, which was published in the *Annual Review of Environment and Resources*, Vol. 31: 193-237 (2006).

Energy Technologies

The term *energy technology* refers to the means of locating, assessing, harvesting, transporting, processing, and transforming the primary energy forms found in nature (e.g., sunlight, biomass,

crude petroleum, coal, uranium-bearing rocks) to yield either direct energy services (e.g., heat from fuel wood or coal) or secondary forms more convenient for human use (e.g., charcoal, gasoline, electricity). Also include under the heading of energy technology is the means of distributing secondary forms to their end users and the means of converting these forms to energy services (e.g., electricity to light and refrigeration, electricity and gasoline to motive power).

A distinction is often made between *energy-supply technologies*, meaning those used to bring energy forms to a point of final use, and *energy end-use technologies*, meaning those applied at this point of use to convert an energy form to a service such as light or motive power.

Research and Development (R&D)

Research includes basic and fundamental research that yield discoveries with potential application to the improvement of energy technologies, and applied research and development that is directed at the invention or improvement of specific energy technologies. Development is aimed at converting the fruits of fundamental and applied research into working prototypes of new or improved technologies.

The Office of Management and Budget (OMB) provides the following federal definitions of basic research, applied research, and development in OMB Circular No. A–11 (2006, Section 84, pp 8–9). Federal expenditures in the conduct of R&D are subcategorized by these three definitions. R&D facilities and major equipment are also reported by OMB as a separate subcategory.

- **Basic research** is defined as systematic study directed toward fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind. Basic research, however, may include activities with broad applications in mind.
- **Applied research** is defined as systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.
- **Development** is defined as systematic application of knowledge or understanding, directed toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

Demonstration and Deployment (D&D)

The *staged model of innovation* as a linear, sequential process beginning with R&D and proceeding to demonstration and finally commercialization is generally refined to capture some two-way or iterative interactions whereby learning in one phase is linked to the other phases. An even more *integrated model of innovation* merges the research, development, demonstration, and deployment (RDD&D) phases by designed interactions between each activity so that no work occurs in isolation. Nonetheless, it is useful to understand and define the stages separately.

The Office of Management and Budget (OMB) does not provide federal definitions of demonstration and deployment in OMB Circular No. A–11. Federal expenditures in the conduct of demonstration activities are usually (but not always) categorized as R&D depending on the nature of the activities. Deployment activities are categorized as non-R&D.

- **Demonstration** activities test scalability and preliminary operating issues to help bring promising technologies closer to market in order to increase chances of adoption by manufacturers. Demonstration projects test new technologies in conditions that approximate real-world applications in order to gain economic and performance data that improve technologies and enhance their potential for commercialization.
- **Deployment** is market support that promotes the adoption of a new technology through greater visibility and familiarization. Even if the technological feasibility was proven during

the demonstration phase, there may be a variety of barriers that make it difficult for the new technology to compete or gain acceptance in the market and thus achieve wide-scale adoption. Deployment activities that help support market penetration can help a new technology reach a tipping point into widespread commercialization. Deployment activities can take many forms, including education, marketing, communication, market research, and other non-R&D market conditioning activities, as well as incentives for adoption.

Section II - AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT

DOE anticipates awarding cooperative agreements under this Funding Opportunity Announcement. DOE may also fund field work authorizations or interagency agreements in support of this FOA. A DOE field work authorization will be awarded to a successful DOE/NNSA Federally Funded Research and Development Center (FFRDC) contractor. Participation by non-DOE/NNSA Federal agencies and their FFRDC contractors' team will be funded under an interagency agreement. A cooperative agreement will be awarded to any other successful entity including, but not limited to, universities, nonprofit organizations, and for-profit organizations.

If determined appropriate, DOE will consider awarding Technology Investment Agreements (TIAs) to a non-FFRDC awardee. TIAs, governed by 10 CFR Part 603, are assistance instruments that DOE can use to increase involvement of commercial entities in research, development and demonstration programs. DOE can award a TIA as a cooperative agreement or as an assistance transaction other than a cooperative agreement. In both cases, DOE has greater flexibility in tailoring the terms and conditions of the TIA, which is not subject to all of the requirements of 10 CFR Part 600. Agreement terms are negotiable in areas such as audits and intellectual property rights that may cause concern for commercial firms that usually do not work with the Government. A non-FFRDC applicant may request a TIA if it believes it will be beneficial to the R&D objectives of the program. After an applicant is selected for award, the Contacting Officer will determine if awarding a TIA would provide benefits to the program that would not likely be realized under another type of assistance award. As described below, DOE will be more amenable to awarding a TIA in support of a proposal from a consortium or a teaming arrangement that includes cost sharing with the private sector. Such a consortium or teaming arrangement could include a DOE/NNSA FFRDC, other Federal agency or its FFRDC. If the DOE/NNSA FFRDC contractor is a part of a consortium or teaming arrangement, the value of, and funding for the DOE/NNSA FFRDC contractor portion of the work will be made through the work-for-others administrative procedures. Funding for another Federal agency or its FFRDC would be through an interagency agreement under the Economy Act or other statutory authority. Other appropriate contractual accommodations such as those involving intellectual property may be made through the funds in agreement to facilitate the FFRDC's participation in the consortium or teaming arrangement. If a TIA is awarded, certain types of information described in 10 CFR 603.420(b) are exempt from disclosure under the Freedom of Information Act for five years after DOE receives the information.

B. ESTIMATED FUNDING

This Hub will be funded at up to $22,000,000 in the first year of the award, with up to $10,000,000 to be used in the first year for the establishment of Hub infrastructure, including building renovation (but no new construction), lease arrangements, equipment, and instrumentation. This Hub will be funded at $25,000,000 per year in years 2-5 of the award period, pending Congressional appropriations.

C. MAXIMUM AND MINIMUM AWARD SIZE

Ceiling (i.e., the maximum amount for an individual award made under this announcement): $122,000,000.00

Floor (i.e., the minimum amount for an individual award made under this announcement): $ None

D. EXPECTED NUMBER OF AWARDS

Number of Awards

- DOE anticipates making one (1) award under this announcement.

E. ANTICIPATED AWARD SIZE

Maximum Award Size Range

- DOE anticipates that a single award will be issued up to $122,000,000 for the total project period. This amount represents the Federal cost share. Applicant cost sharing will be required in accordance with cost sharing provisions detailed in this announcement.

F. PERIOD OF PERFORMANCE

DOE anticipates making one award at an award level up to $22,000,000 in year one of the award and up to $25,000,000 per year in subsequent award years, up to a total of five years. Funding for Hubs delivering exceptional scientific progress may be renewed for a second five-year term.

G. TYPE OF APPLICATION

New Applications Only

- DOE will accept only new applications under this announcement.

Section III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

All types of domestic entities(defined as any entity incorporated in the United States and having a substantial U.S. presence, as evidenced by having a significant business center and/or significant employment in the U.S.), including DOE/NNSA Federally Funded Research and Development Centers (FFRDC) contractors, are eligible to apply as prime applicants, with the exception of other Federal agencies, non-DOE/NNSA FFRDC contractors, and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995. DOE may also consider making an award to a consortium, under a TIA award. See 10 CFR §§ 603.225(b) and 603.515.

B. OTHER ELIGIBILITY REQUIREMENTS

Team Arrangements

Entities proposing as a team or consortium must designate a lead organization with strong scientific leadership and a clearly defined central location. Applications must be submitted on behalf of the team members by the lead organization and DOE will enter into a prime award relationship with the designated lead organization. The designated lead organization, i.e., the prime applicant, must perform a greater percentage of the effort than any other institution that is

part of the team or relative to a subcontractor. **If an application is received in which the prime applicant is not performing a greater percentage of the effort than that of any individual team members or subcontractors, the application may be deemed non-responsive and rejected without further review.**

Eligible/Ineligible Entities

With the exception of foreign entities, the definition of Eligible Applicants set forth above in Part III, Section A. applies to all parties involved in an application, including the lead organization that actually submits the application (prime applicant) and all other institutions involved in any way in the proposed Hub (team members and/or subcontractors). Foreign entities and non-DOE/NNSA Federal agencies and their FFRDC contractors may not be the lead applicant, but may be proposed as a team member and/or subcontractor. If awarded, the non-DOE/NNSA Federal agencies and their FFRDC contractor team participants would be funded under an interagency agreement or other statutory authority.

Additionally, nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995, may not be the lead applicant, team members, and/or subcontractors; nor be involved in any way in the application.

DOE/NNSA FFRDC Contractors

DOE/NNSA FFRDC applicants are eligible to apply for funding under this announcement if their cognizant Contracting Officer provides written authorization and this authorization is submitted with the application as part of the Budget for DOE/NNSA FFRDC Contractor File. If a DOE/NNSA FFRDC is selected for award, or proposed as a team member, the proposed work will be authorized under the DOE field work authorization system and performed under the laboratory's Management and Operating (M&O) contract. The following wording is acceptable for the authorization:

"Authorization is granted for the _____ Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complimentary to the missions of the laboratory and will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory."

Applications that do not include the required cognizant Contracting Officer written authorization as specified above may be deemed non-responsive and rejected without further review.

If an award is made to a DOE/NNSA National Laboratory, all Disputes and Claims will be resolved in accordance with the terms and conditions of the DOE/NNSA National Laboratory's M&O contract in consultation between DOE and the prime awardee.

Non-DOE/NNSA Federally Funded Research and Development Contractors (FFRDC)

Non-DOE/NNSA FFRDC contractors are not eligible for a prime award under this announcement, but they may be proposed as a team member on another entity's application subject to the following guidelines:

Authorization for non-DOE/NNSA FFRDCs. The cognizant Contracting Officer for the Federal agency sponsoring the FFRDC contractor must authorize in writing the participation of the FFRDC contractor on the proposed project and this authorization must be submitted with the application. The written authorization must also contain a determination that the use of a FFRDC contractor is consistent with the contractor's authority under its award and does not place the FFRDC contractor in direct competition with the private sector, in accordance with FAR Part 17.5.

Value/Funding:

The value of, and funding for, a DOE/NNSA FFRDC contractor, a non-DOE/NNSA FFRDC contractor, or another Federal agency's portion of the work will not be included in the award to a successful applicant. DOE will fund a DOE/NNSA FFRDC contractor through the DOE field work authorization system and will fund other non-DOE/NNSA FFRDC contractors and other Federal agencies through an interagency agreement or other statutory authority. However, if cost sharing is proposed, the applicant's cost share will be based only on the applicant's or the FFRDC contractor's or other Federal agency's portion of the effort.

If a TIA is awarded as an assistance transaction other than a cooperative agreement, elements might include shared intellectual property, proprietary access to research results, and other favored relationships consistent with the level of cost sharing and the TIA regulations. Applicants should understand, however, that certain information arising out of the Hubs will be made publicly available consistent with DOE policy (e.g., unique research resources, etc.).

Responsibility:

The applicant, if successful, will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues, including but not limited to, disputes and claims arising out of any agreement between the applicant and any subcontractor.
If an award is made to another Federal agency or its FFRDC, all Disputes and Claims will be resolved in accordance with the terms and conditions of the interagency agreement in consultation between DOE and the prime awardee.

C. COST SHARING

For the purposes of cost sharing, the proposed activities of the Hub are divided into two types, following the definitions put forth in Section I.G, Definition of Terms:

- Basic and applied research and development (R&D)
- Technology demonstration and deployment (D&D)

For-profit entities are required to provide a minimum of 20% cost share for both R&D and D&D activities. This cost share will be based on the portion of the Hub budget proposed by each for-profit entity. For all other non-Federal entities, cost sharing is encouraged, but not required for R&D, and a minimum of 20% is required for D&D activities. The cost share for D&D activities will be based on the portion of the Hub budget proposed by each entity. All entities must include required cost share in their proposed budgets. All cost shared funding must come from non-Federal sources unless otherwise permitted by law. The Contracting Officer may accept contributions that meet the criteria set forth in 10 CFR 600.30.

These cost sharing requirements are consistent with EPAct 2005, Sec. 988. D&D as defined in Section I.G falls under the category of "demonstration and commercial application" specified in EPAct 2005, Sec. 988. However, there is no expectation that a Hub will commercialize the energy technology it develops, but will assist in the deployment of that technology through transfer to industry, which will perform the commercial applications.

Cost sharing is also generally required for TIA awards. To the maximum extent practicable, the non-Federal parties performing the work under a TIA are to provide at least 50% cost sharing in conformance with 10 CFR 603.525 through 10 CFR 603.555. The Contracting Officer will consider the amount of cost sharing proposed in determining if a TIA is the appropriate instrument for a project. The Contracting Officer may accept any cash or in-kind contributions that meet the criteria set forth in 10 CFR 603.530 through 10 CFR 603.555. In addition, the Contracting Officer may consider whether cost sharing is impracticable, after assessing the Applicant's other commitments to successfully performing the work.

Section IV - APPLICATION AND SUBMISSION INFORMATION

A. ADDRESS TO REQUEST APPLICATION PACKAGE

1. Application Forms

Application forms and instructions are available at Grants.gov. To access these materials, go to http://www.grants.gov, select "Apply for Grants," and then select "Download Application Package." Enter the CFDA and/or the funding opportunity number located on the cover of this announcement and then follow the prompts to save the application package. Once you have SAVED the application package and completed all the required documentation, you will submit your application via the Save & Submit selection in Grants.gov.

2. Limitation on Number of Lead Applications

A specific entity may not submit more than **one** application as the prime applicant for this particular FOA. If more than one application is received from a prime applicant, DOE will consider only the last application received based on the FedConnect date and time stamp. The remaining applications will be deemed non-responsive and rejected without further review. However, there is no limitation on the number of applications in which a specific eligible entity participates as a team member/subcontractor.

B. LETTER OF INTENT AND PRE-APPLICATION

1. Letter of Intent.

Letters of Intent are not required.

2. Pre-Application/Application Abstract (optional submission)

Pre-applications/applications abstracts are requested, but not required under this announcement. You do not have to submit a pre-application/application abstract to be eligible to submit a complete application for consideration.

For interested parties desiring to submit a pre-application/application abstract, you must complete the SF 424 (or SF424 R&R), attach your pre-application file in the block provided, and submit electronically to minorkl@id.doe.gov

The Pre-Application/Application Abstracts shall be no more than three (3) pages long and address the following information:

- Identification of team lead and primary team members (known to-date)
- A statement of qualifications/experience of the team lead team member and primary team members
- A description of the team's proposed technical concept (including the nuclear reactor that will be the focus of the proposed Hub) the nuclear energy technologies to be addressed and the methods to be employed, for establishing and operating the Hub to achieve program objectives

As described in Section V.A.1 Pre-Applications/Application Abstracts shall be evaluated by the DOE, including a preliminary assessment as to the adequacy/acceptability (as it relates to the Hub concept and objectives) of the proposed team, including team qualifications/experience. It will also include a preliminary assessment as to the adequacy/acceptability of the team's proposed technical concept, including methods to be employed, for establishing and operating the Hub to achieve program objectives.

C. CONTENT AND APPLICATION FORMS

You must complete the mandatory forms and any applicable optional forms (e.g., Disclosure of Lobbying Activities (SF-LLL)) in accordance with the instructions on the forms and the additional instructions below. Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.

1. SF 424 (R&R)

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. The list of certifications and assurances referenced in Field 17 can be found on the DOE Financial Assistance Forms Page at http://management.energy.gov/business_doe/business_forms.htm under Certification and Assurances.

2. Research and Related Other Project Information

Complete questions 1 through 6 and attach files. The files must comply with the following instructions:

Project Summary/Abstract (Field 7 on the Form)

The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant , key personnel proposed for the project (e.g., the Hub Director, the Project Director/Principal Investigator(s)), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (i.e., benefits, outcomes), and, for collaborative projects, the dollar value of the effort to be performed by each participant over the five-year project period and a brief description of the capacity in which the participant will be participating. This document must not include any proprietary or sensitive business information as the Department may make it available to the public. The project summary must not exceed 1 page when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) {single spaced} with font not smaller than Times New Roman 12 point. To attach a Project Summary/Abstract, click "Add Attachment."

It will be up to the applicant to define who their key personnel are and the role they will play in accomplishing the project. Key personnel include such positions as Hub director, project manager, deputy project manager, principle investigator(s), etc, or any other persons having a significant role in the successful outcome of the Hub project. Personnel identified in the application proposal as key personnel will be expected to devote the majority of their time (e.g., hours) toward the project, unless otherwise acceptably justified in the applicant's proposal and concurred to by DOE.

Project Narrative (Field 8 on the Form)

The project narrative must not exceed 75 pages, including charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left, and right). **EVALUATORS WILL ONLY REVIEW THE NUMBER OF PAGES SPECIFIED IN THE PRECEDING SENTENCE.** A cover page and table of contents must be included at the beginning of the project narrative but neither will count against the page limit. Furthermore, information required to be submitted in the requested appendices are not subject to the project narrative page limit. Headers/footers containing page numbers and project titles/logos may be inserted within the required 1" margins. The font must not be smaller than Times New Roman 12-point (except for minimal use as needed in Tables, Figures, and Footnotes). Do not include any Internet addresses (URLs) that provide information necessary to review the

application, because the information contained in these sites will not be reviewed. See Part VIII.D for instructions on how to mark proprietary application information. To attach a Project Narrative, click “Add Attachment.”

The contents of the project narrative are specified in order to ensure that the merit reviewers have the necessary information to conduct proper evaluations; applicants are to submit their applications in the order specified in the FOA to facilitate the review process. If any information submitted must be done so out of order of that directed in the FOA, this must be clearly identified.. All project narratives are to include the following five components:

Project Objectives: An important element of the Modeling and Simulation Hub is that research and development (R&D) components of the Hub will be integrated into an effective whole. The mission focus of the Hub is to apply existing and/or newly developed modeling and simulation capabilities to create a user environment that allows engineers to simulate an operating reactor(s) that will act as a "virtual model" of that reactor(s). The Hub also will obtain data from the “real physical” reactor(s) that will validate the "virtual model." In turn, engineers will use the "virtual model" to address important questions about the operations of and safety basis for the reactor(s), such as can the reactor(s) be uprated in power and operate safely for an extended period of time. Finally, the combination of the "virtual model" and the physical reactor(s) will be used to communicate the potential role of science-based modeling and simulation to address technology issues concerning nuclear energy in the near, mid, and long terms.

The project narrative shall include the identification of the “real physical” reactor(s) that will be the mission focus of the Hub. The narrative shall address the reasons that the chosen reactor(s) is of interest to the Department and discuss the arrangements with the reactor operators and regulatory authorities to allow the reactor(s) to be the focus of the development of the “virtual model.” In addition, the narrative shall discuss the types of nuclear energy issues that will be addressable by the “virtual model”

The project narrative shall discuss the proposed approach to adapting and assembling the technologies that have been developed for use in the scientific modeling and simulation environment to allow them to be used to support engineering processes. This should include a discussion of how functional requirements will be collected and the system engineering processes used to document how the requirements are satisfied. Where determined by the applicant, the project narrative should also discuss the development of new modeling and simulation capabilities. This part of the narrative should also discuss any plans for software engineering and quality practices. The narrative should discuss educational components of the proposed project, including how the Hub will support advanced educational processes. Finally, the project narrative shall discuss the applicant’s plans for using data (either existing or newly obtained) from the operating reactor(s) as part of a process of validating the “virtual model.”

Merit Review Criteria Discussion: The section should be formatted to address each of the merit review criteria and sub-criteria listed in Part V.A. Provide sufficient information so that reviewers will be able to evaluate the application in accordance with these merit review criteria. DOE WILL EVALUATE AND CONSIDER ONLY THOSE APPLICATIONS THAT ADDRESS SEPARATELY EACH OF THE MERIT REVIEW CRITERIA AND SUB-CRITERIA.

Relevance and Outcomes/Impacts: This section should explain the relevance of the effort to the objectives in the program announcement and the expected outcomes and/or impacts.

Statement Of Project Objectives (SOPO): The project narrative must contain a single, detailed Statement of Project Objectives that addresses how the project objectives will be met. The Statement of Project Objectives must contain a clear, concise description of all activities to be completed during project performance and follow the structure discussed below. The primary focus of the proposals should be on what significant progress will be made in the first 5 year award term. Beyond that, applicants can and should address how that progress could lead to a possible second award term. The Statement of Project Objectives may be released to the public by DOE in whole or in part at any time. It is therefore required that it shall not contain proprietary or confidential business information. The Statement of Project Objectives is generally less than five (5) pages in total for the proposed work. Applicants shall prepare the Statement of Project Objectives in the following format:

TITLE OF WORK TO BE PERFORMED (Insert the title of work to be performed. Be concise and descriptive.)

A. OBJECTIVES
Include one paragraph on the overall objective(s) of the work. Also, include objective(s) for each phase of the work.

B. SCOPE OF WORK
This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the work for each Phase.

C. TASKS TO BE PERFORMED
Tasks, concisely written, should be provided in a logical sequence and should be divided into the phases of the project, as appropriate per the format below. This section provides a brief summary of the planned approach to this project. An outline of the Project Management Plan (referenced in Task 1.0 below and required to be submitted with your application) is provided later in this Section.

Task 1.0 - Project Management and Planning
(Description includes work elements required to revise and maintain the Project Management Plan and to manage and report on activities in accordance with the plan)
Subtask 1.1
(Description)

Task 2.0 - (Title)

Project Management Plan: This plan should be formatted to include the following sections with each section to include the information as described below:

a. Executive Summary: Provide a description of the project that includes the objective, project goals, and expected results. For purposes of the application, this information is included in the Project Narrative (Field 8) and should be simply copied to this document for completeness, so that the Project Management Plan is a stand-alone document.

b. Approach to the "One Roof" Requirement: DOE believes that collation (also known as "One Roof") is the preferred approach to enhance collaboration within the Hub; however, we recognize that modern communications technologies do enable a broader definition of "One Roof." Nevertheless, the FOA emphasizes that strong scientific leadership must be

located at the primary location of the Hub. This leadership will “infuse” rather than “diffuse” the culture of One Roof. This section will describe the project management approach that best satisfies the intent of the “One Roof” concept, not necessarily focusing on how the organization will be “co-located”, but on whether and how the proposed team will achieve the necessary collaboration using a centrally led “integrated” model of research towards a challenge goal. .

c. Roles of Participants: In this section of the application, proposers are expected to provide a clear discussion of why the team being proposed is the best one to execute the approach described in the application. Describe the roles and the work to be performed by each participant/investigator, business agreements between the applicant and participants, and how the various efforts will be integrated and managed. This discussion shall also cover the unique talent provided by each team member and a discussion of how the combination of the entire team will increase the likelihood that the Hub will accomplish the objectives as described above.

d. Multiple Principal Investigators: The applicant, whether a single organization or team/partnership/consortium, must indicate if the project will include multiple PIs. This decision is solely the responsibility of the applicant. If multiple PIs will be designated, the application must identify the Contact PI/Project Coordinator and provide a "Coordination and Management Plan" that describes the organization structure of the project as it pertains to the designation of multiple PIs. This plan should, at a minimum, include:

- process for making decisions on scientific/technical direction;
- publications;
- intellectual property issues;
- communication plans;
- procedures for resolving conflicts; and
- PIs' roles and administrative, technical, and scientific responsibilities for the project.

e. Software Engineering and Quality Plans: Provide a description of the processes that will be used to ensure that software is developed using appropriate software engineering and quality practices so the that products of the Hub can be moved quickly from the research environment to a production environment.

f. Risk Management: Provide a summary description of the proposed approach to identify, analyze, and respond to perceived risks associated with the proposed project. Project risk events are uncertain future events that, if realized, impact the success of the project. As a minimum, include the initial identification of significant technical, resource, and management issues that have the potential to impede project progress and strategies to minimize impacts from those issues.

g. Milestone Log: Provide milestones for each budget period (or phase) of the project. Each milestone should include a title and planned completion date. Milestones should be quantitative and show progress toward budget period and/or project goals.

Note: During project performance, the Recipient will report the Milestone Status as part of the required quarterly Progress Report as prescribed under Attachment 4, Reporting Requirements Checklist. The Milestone Status will present actual performance in comparison with Milestone Log, and include:

(1) the actual status and progress of the project,

(2) specific progress made toward achieving the project's milestones, and,
(3) any proposed changes in the project's schedule required to complete milestones.

h. **Transition Plan:** Given that the Hub successfully develops relevant modeling and simulation technology, provide a description of the plans to move that technology out of the Hub environment and into a form that will impact nuclear energy technologies. This plan should deal with issues of Intellectual Property and how the applicant teams intend to treat IP among the team and how the applicant intentions for commercialization.

i. **Plans for Team Memorandums of Understanding (MOUs):** Where the applicants are planning teams of multiple institutions, provide the plans for Memorandums of Understanding (MOUs) among the team members. These plans should cover the full range of issues that could exist to create a cohesive working arrangement between team members. This could include issues like: Human Resources, Environmental, Safety, and Health Policies, Procurement, Intellectual Property, and Technology Transfer. Applicants are not required to fully negotiate the MOUs prior to submission of the final application, but shall provide their plans for executing the MOUs if they receive an award.

Appendices (not included in Project Narrative page limits above)
In addition to the contents of the Project Narrative described above, attach the following appendices. **Do not attach, unless indicated, any of the requested appendices described below as files for fields 8, 9, 10, and 11, instead follow the above instructions to include the information as appendices to the Project Narrative file.**

Appendix 1: Bibliography & References Cited

Provide a bibliography of any references cited in the project narrative. Please provide this information as an appendix to your project narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application.

Appendix 2: Budget Detail Package

Using the Awardee Budget Detail Package attached to this FOA, provide a high-level summary of the proposed budget for the Hub that includes the following data by year for each institution participating in the project. The lead institution is to be represented in the initial pages of the form with other participants and their contributions listed in the "Contractual" section. Details for the other participants should also be provided in the Subawardee sheets. In the Budget Justification supporting the amounts listed in the Budget Detail Package, provide: the names and support levels (in months) of the senior/key personnel supported by the Hub at the institution, and the number and type of other personnel supported by the Hub at the institution (i.e., postdocs, graduate students, undergraduate students, technical support, administrative support, etc.). Budget information should be presented over the five-year initial award period. Attach the completed Budget Detail Package to the R&R Other Project Information form in Field 11 – Add Attachments.

Appendix 3: Environment, Safety and Health (ES&H) and Security Approaches

Applicants should provide information on the proposed approach for handling environment, safety and health, and security issues and assuring environmental compliance during Hub establishment and research and development activities; procedures for ensuring security, including access to data stored on Hub computers; the ES&H compliance history of the lead and partner institutions over the last five years (e.g. EPA and state environmental notices of violation, OSHA citations, status of any resulting action plans); and any anticipated environmental permit requirements, including NEPA, for the proposed Hub and proposed schedule for compliance with environmental permits and NEPA requirements.

Appendix 4: Intellectual Property (IP) Management Plan

Each Hub should include within their application a proposed IP Management Plan that ensures and facilitates compliance with Federal IP law and policy, the public interest regarding dissemination of scientific reports/results, and the rapid transfer of technology in the topical area of the Hub. The plan should address title to inventions and other IP among the Hub members. Unless the applicant requests a TIA, the statutes governing disposition of title to new inventions under Government agreements will be followed:

i. The Bayh-Dole Act, 35 U.S.C. 200 et seq., requires that Universities, Non-Profits and small business who are participating under a funding agreement will have the option to retain title to their own employees' inventions.

ii. The Federal Non Nuclear Energy Act of 1974, 42 U.S.C. 5908, will govern disposition of title for all other parties, regardless of whether they receive government funding and requires that the Government obtains title to new inventions unless a waiver is granted. DOE regulations at 10 C.F.R. 784 address the factors that are considered in the granting of waivers, including whether the waiver is needed to secure participation, private investment being made or likely to be made, the commercial position of the waiver requestor, etc.

iii. Inventions made by employees of an FFRDC will be subject to the M&O contract terms and conditions with respect to ownership of inventions made by lab employees.

iv. The agreement will provide the capability for the Hub to license other forms of IP such as copyright in software and bailment of biological materials.

This FOA allows applicants to request a TIA. In a TIA the intellectual property rights are not subject to the requirements of the Bayh-Dole Act or 42 U.S.C. 5908 and are negotiable. If the applicant requests a TIA and DOE determines it is appropriate to award a TIA, patent rights will be negotiated pursuant to the guidance set out in 10 C.F.R. 603.840 through 10 C.F.R. 603.875

The plan should also address a simplified means of IP licensing by the Hub, and should include a discussion on the means to distribute the benefits (royalties and equity) after expenses of any licensing among appropriate team members.

Appendix 5: Hub Site, Acquisition, Design and Development Plan

Discuss the plans for locating the proposed Hub. Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s). This includes identification of the site or sites where the major activities of the Hub will take place and how the site(s) will be acquired (use of space provided by the host institution(s), leased space, or combinations of these and other options) and prepared for use by the Hub. The application should describe the proposed size, conceptual layout, and development strategy (including summary-level scope, schedule and cost estimates including alteration and/or renovations for the space, i.e., the estimated cost to build out the space) for the space needed to house and support the research program identified in the narrative. Plans for acquisition of major equipment and instrumentation (items costing $1 million or more) should be included.

Appendix 6: Funding Plan

Discuss strategy for development of funding for the proposed Hub including, but not limited to, cost sharing (if applicable) and DOE funding.

Appendix 7: Project Timetable

This section should outline as a function of time, year by year, all the major activities or phases of the proposed Hub. The successful applicant will be expected to employ standard project management discipline and must use this project timetable to report progress.

Appendix 8: Biographical Sketches

Provide a biographical sketch for the Hub Director, Principal Investigator(s) and each senior/key person listed in Section A on the R&R Budget form, or proposed as a subawardee or consultant, if they meet the definition of a senior/key person. The designation of multiple Principal Investigators, including Principal Investigators employed by teaming partners is allowed. The biographical information for each person must not exceed three pages when printed on 8.5" by 11" paper with 1" margins (top, bottom, left, and right) with font not smaller than Times New Roman 12 point; the specification of URLs in the information provided is not permitted. Please provide this information as an appendix to your project narrative**.** Include:

Education and Training: For undergraduate, graduate and postdoctoral training, provide institution, major/area, degree, and year.

Research and Professional Experience: Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

Publications: Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.

Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications.

Synergistic Activities: List no more than five professional and scholarly activities related to the effort proposed.

Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers: Provide the following information in this section.

Collaborators and Co-editors: List in alphabetical order all persons, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with you on a research project, book or book article, report, abstract, or paper most closely related to the proposed project during the 48 months preceding the submission of this application. Also, list any individuals who are currently or have been, co-editors with you on a special issue of a journal, compendium, or conference proceedings most closely related to the proposed project during the 24 months preceding submission of this application. If there are no collaborators or co-editors to report, state "None."

Graduate and Postdoctoral Advisors and Advisees: List the names and current organizational affiliations of your graduate advisor(s) and principal postdoctoral sponsor(s) during the last five years. Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates during the last five years.

Appendix 9A: Hub Director Statement of Employment

Hub Director Statement of Employment: For the Hub Director, submit documentation stating that the proposed Hub Director is an employee of the prime applicant. The statement of employment is limited to one page and must be signed by both the Hub Director and an authorized representative of the prime applicant.

Appendix 9B: Individual Commitment Statements

Individual Commitment Statement: For each senior/key person, including the Hub Director(s) and Principal Investigator(s), provide a current signed and dated commitment statement that reflects their commitment to this project, including their individual level of time commitment, for a minimum period of five years. Multiple personnel representing the same institution may sign the same letter of commitment, as applicable. Each letter of commitment is limited to one page.

Appendix 10: Current and Pending Support

Provide a list of all current and pending support (both Federal and non-Federal) for the Hub Director, Principal Investigator(s) and senior/key persons, including subawardees and consultants, for ongoing projects and pending applications as an appendix to the project narrative. For each organization providing support, show the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the senior/key person. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review.

Appendix 11: Facilities & Other Resources

This information is used to assess the capability of the organizational resources, including subawardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical, and Other). If appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. It will be up to the applicant to describe the physical complex they propose to accomplish the Hub objectives. As such, the application should describe

the relative proximity of those facilities to the other proposed facilities where the project is being executed. Describe only those resources that are directly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. In order to reduce the number of files attached to your application, please provide the Facility and Other Resource information as an appendix to your project narrative.

Appendix 12: Equipment

List major items of equipment already available for this project and, if appropriate, identify location and pertinent capabilities. In order to reduce the number of files attached to your application, please provide the Equipment information as an appendix to your project narrative.

Appendix 13: Statement of Conflict of Interest

At the time of submission, the applicant shall include information identifying potential, apparent, or actual organizational and individual conflicts of interest and proposed mitigation. This shall include applicants, their team members, and senior/key personnel named in the application. Negative responses are also required. Prior to award, DOE reserves the right to require the submission of a Conflict of Interest Management Plan describing the applicant's approach to managing conflicts of interest. Do not attach a separate file. This appendix will not count in the project narrative page limitation.

Appendix 14: Organizational Letters of Commitment

A single organizational letter of commitment is required from each organization participating as a team member. Each letter of commitment must be current, signed, and dated from an organization participating as a team member must be signed by the person authorized to commit the organization to a legally binding agreement for this project. Each organizational letter of commitment is limited to one page. Do not attach a separate file. This appendix will not count in the project narrative page limitation.

Appendix 15: Commitment Letters from Third Parties Contributing to Cost Sharing

If a third party, (i.e., a party other than the organization submitting the application) proposes to provide all or part of any proposed cost sharing, you must provide a letter from the third party stating that it is committed to providing a specific minimum dollar amount of cost sharing. The letter should also identify the proposed cost sharing (e.g., cash, services, and/or property) to be contributed. Letters must be signed by the person authorized to commit the expenditure of funds by the entity. Provide this information in a single file named "CLTP.pdf" and click on "Add Optional Other Attachment" to attach.

Appendix 16: Awardee Point of Contact Data Input Sheet

Using the Awardee Point of Contact Data Input Sheet attached to this FOA, provide the point of contact information required by this sheet. Attach the completed sheet to the R&R Other Project Information form in Field 11 – Add Attachments.

Appendix 17: Other Attachments

If you need to elaborate on your responses to questions 1-5 on the "Other Project Information" document, please provide this information should also be provided as an appendix to your project narrative. Do not attach a separate file. This appendix will not count in the project narrative page limitation.

3. Research and Related Budget (TOTAL FED + NON-FED)

Complete the Research and Related Budget (Total Fed & Non-Fed) form in accordance with the instructions on the form and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (See Section IV.G).

Budget Justification (Field K on the form).

Provide the required supporting information for the following costs (See R&R instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. If a non-DOE/NNSA Federal agency and/or their FFRDC contractor will serve as a vendor of materials, supplies, equipment, space and/or scientific and technical advisory services to a proposed HUB, submit evidence of the non-DOE/NNSA Federal agencies authority and agreement to provide said items to DOE as part of the budget justification file. For any cost sharing, identify the source, amount, description, and the Budget Detail Package sheet title and line item, if applicable, where the dollar amount was included. Attach a single budget justification file for the entire project period in Field K. The file automatically carries over to each budget year.

Commitment Letters from Third Parties Contributing to Cost Sharing.

If a third party, (i.e., a party other than the organization submitting the application) proposes to provide all or part of any proposed cost sharing, you must provide a letter from the third party stating that it is committed to providing a specific minimum dollar amount of cost sharing. The letter should also identify the proposed cost sharing (e.g., cash, services, and/or property) to be contributed. Letters must be signed by the person authorized to commit the expenditure of funds by the entity. Provide this information in a single file named “CLTP.pdf” and click on “Add Optional Other Attachment” to attach.

Budget for DOE/NNSA National Laboratory Contractor, if applicable.

If a DOE/NNSA National Laboratory contractor is to perform any portion of the work, the DOE/NNSA National Laboratory must provide a DOE Field Work Proposal in accordance with the requirements in DOE Order 412.1A, Work Authorization System. This order and a sample of the DOE Field Work Proposal (FWP) form are available at http://www.management.energy.gov/documents/o4121.pdf. For purposes of satisfying this requirement, applicants are required to submit the DOE FWP face and budget pages (pages 1 and 2 of the sample form) with the application as part of the Budget for DOE/NNSA National Laboratory Contractor file. Furthermore, the information requested in blocks 1. through 15. and 17. through 19. of the sample FWP must be furnished with the application. The remainder of the information requested in blocks 16., 20., and 21. of the sample form will be required to be submitted through the DOE Work Authorization System by the successful applicant after selection. In addition, include the required cognizant Federal Contracting Officer approval authorizing the participation of the DOE/NNSA National Laboratory as described in Part III.C. This information is required in addition to the budgetary information requested herein (R&R Budget , R&R Subaward Budget, and Budget Justification, as applicable). Use up to 10 letters of the DOE/NNSA National Laboratory name (plus.pdf) as the file name and attach to the R&R Other Project Information form in Field 11 – Add Attachments

4. R&R Subaward Budget Form

Budgets for Subawardees. You must provide a separate cumulative R&R budget for each subawardee, including DOE/NNSA National Laboratory Contractors, that is expected to perform work estimated to be more than $100,000 or 50 percent of the total work effort (whichever is less). Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET FORM and e-mail it to each subawardee that is required to submit a separate budget. After the subawardee has e-mailed its completed budget back to you, attach it to one of the blocks provided on the form. Use up to 10 letters of the subawardee's name as the file name. If a subaward is being proposed for a DOE/NNSA National Laboratory Contractor, then you must also submit the appropriate Field Work Proposal and cognizant Federal Contracting Officer authorization as described above.

If a subaward is being proposed for a non-DOE/NNSA FFRDC contractor, the required authorization by the cognizant Contracting Officer for the Federal sponsoring agency, as required in Section III.C., Other Eligibility Requirements, must be submitted.

5. Project/Performance Site Location (s)

Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided.

Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover the cursor over this field for additional instructions.

Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

6. Disclosure of Lobbying Activities (SF-LLL)

If applicable, complete SF- LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

D. SUMMARY OF REQUIRED FORMS AND FILES

Your application must include the following documents:

Summary of Required Forms/Files

Your application must include the following documents:

Name of Document	Format	Attach to
SF 424 (R&R)	Form	N/A
RESEARCH AND RELATED OTHER PROJECT INFORMATION	Form	N/A
Project Summary/Abstract	PDF	Field 7
Project Narrative	PDF	Field 8
Project Narrative Appendices 1, 3-14	PDF	N/A
Project Narrative Appendices 2 and 15	XLS	Field 11
RESEARCH AND RELATED BUDGET	Form	N/A

Budget Justification	PDF	Field K
Commitment Letters from Third Parties Contributing to Cost Sharing	PDF	N/A
Budget for DOE/NNSA National Laboratory Contractor, if applicable	PDF	N/A
R&R SUBAWARD BUDGET ATTACHMENT(S) FORM, if applicable	Form	N/A
PROJECT/PERFORMANCE SITE LOCATION(S)	Form	N/A
SF-LLL DISCLOSURE OF LOBBYING ACTIVITIES, if applicable	Form	N/A

E. SUBMISSION FROM SUCCESSFUL APPLICANT

The successful applicant must submit the information listed below not later than 15 calendar days after notification of selection. Successful applicants who fail to provide the information within the required time period may be eliminated from further consideration.

What to submit	Required Form or Format
Designated Responsible Employee for complying with national policies prohibiting discrimination. Provide organization name, project title, DOE application tracking number and the name, title, and phone number of Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5).	No special format. E-mail information not later than 15 calendar days after selection to: minorkl@id.doe.gov
Representation of Limited Rights Data and Restricted Software	Use form on Applicant and Recipient Page at http://grants.pr.doe.gov. E-mail this representation not later than 15 calendar days after selection to minorkl@id.doe.gov
Environmental Evaluation Notification Form. You must complete and submit this environmental questionnaire. NOTE: The NEPA process must be completed prior to taking any action on the proposed project that could have adverse environmental effects or that would limit the choice of reasonable alternatives.	This form and instructions are available at http://www.ch.doe.gov/offices/ACQ/docs/ E-mail the completed Environmental Evaluation Notification form not later than 15 calendar days after selection to minorkl@id.doe.gov.

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information
- Other budget information
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable

F. SUBMISSION DATES AND TIMES

1. Pre-application Due Date

Pre-applications submissions are optional. Pre-applications should be received by February 1, 2010, not later than 11:59:59 PM Eastern Time. You are encouraged to transmit your application well before the deadline.

2. Application Due Date

Applications should be received by March 1, 2010, not later than 08:00:00 PM Eastern Time. You are encouraged to transmit your application well before the deadline. The Grants.gov Helpdesk is not available after 9:00 PM Eastern Time. APPLICATIONS RECEIVED AFTER THE DEADLINE MAY NOT BE REVIEWED OR CONSIDERED FOR AWARD.

G. INTERGOVERNMENTAL REVIEW

This program is not subject to Executive Order 12372 - Intergovernmental Review of Federal Programs.

H. FUNDING RESTRICTIONS

Cost Principles: Costs must be allowable in accordance with the applicable Federal cost principles referenced in 10 CFR Part 600 or the cost principles in FAR Part 31 and DEAR Parts 931 and 970.31.

Pre-award Costs: Recipients, other than DOE/NNSA FFRDC contractors, may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 10 CFR Part 600. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

In the event a TIA is awarded, pre-award costs may be charged to the agreement only with the specific approval of the Contracting Officer, in accordance with 10 CFR § 603.830.

I. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where To Submit

APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD.

Submit electronic applications through the *Apply for Grants* function at www.Grants.gov. If you have problems completing the registration process or submitting your application, call Grants.gov at 1-800-518-4726 or send an email to support@grants.gov.

2. Registration Process

You must COMPLETE the one-time registration process (all steps) before you can submit your first application through Grants.gov (See www.grants.gov/GetStarted). We recommend that you start this process at least three weeks before the application due date. It may take 21 calendar days or more to complete the entire process. Use the Grants.gov Organizational Registration Checklists at http://www.grants.gov/assets/OrganizationRegCheck.pdf to guide you through the process. IMPORTANT: During the CCR registration process, you will be asked to designate an E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called *Marketing Partner identification Number* (MPIN). When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e., Grants.gov registration).

3. APPLICATION RECEIPT NOTICES

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of five e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. When the AOR receives email Number 5, it is
their responsibility to follow the instructions in the email to logon to IIPS and verify that their application was received by DOE. You will need the Submission Receipt Number (email Number 1) to track a submission. The titles of the five e-mails are:

Number 1 - Grants.gov Submission Receipt Number

Number 2 - Grants.gov Submission Validation Receipt for Application Number

Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number

Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number

Number 5 - DOE e-Center Grant Application Received

The last email will contain instructions for the AOR to register with the DOE e-Center. If the AOR is already registered with the DOE e-Center, the title of the last email changes to:

> "Number 5 - DOE e-Center Grant Application Received and Matched "

This email will contain the direct link to the application in IIPS. The AOR will need to enter their DOE e-Center user id and password to access the application.
One Time Registration Process

There are several one-time actions you must complete in order to submit an application in response to this Announcement (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), and register with Grants.gov). Applicants, who are not registered with CCR and Grants.gov, should allow at least 10 days to complete these requirements. It is suggested that the process be started as soon as possible.

Section V – APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Pre-Application/Application Abstract Review.

Pre-Application/Application Abstract Review. Pre-Applications/Application Abstracts shall be evaluated by the DOE, including a preliminary assessment as to the adequacy/acceptability (as it relates to the Hub concept and objectives) of the proposed team, including team qualifications/experience. It will also include a preliminary assessment as to the adequacy/acceptability of the team's proposed technical concept, including methods to be employed, for establishing and operating the Hub to achieve program objectives.

All Pre-Applications/Application Abstracts will be evaluated in accordance with the above criteria. At the completion of the review/evaluation process, DOE shall notify respondents in writing the results of their pre-application review. Respondents will be invited to participate in the resultant funding opportunity announcement and submit a full application or, based on the information submitted, respondents will be notified that they are unlikely to be a viable competitor. DOE shall advise respondents considered not to be viable competitors of the general basis for that opinion. DOE shall inform all respondents that, notwithstanding the advice provided by the Government in response to their submissions, they may participate in the resultant funding opportunity announcement and submit a full application for consideration.

2. Initial Application Review Criteria

Application Award Eligibility: Prior to a comprehensive merit evaluation, DOE will perform an initial review of the full application submitted to determine at a minimum that (1) the applicant is eligible for an award; (2) the information required by the announcement has been submitted; (3) all mandatory requirements are satisfied; and (4) the proposed project is responsive to the objectives of the funding opportunity announcement.

3. Merit Review Criteria

Only those applications meeting the minimum requirements of this FOA will be considered for selection. Selection will be made in accordance with the following selection criteria and programmatic considerations listed in Paragraph 4 of this section. All applications will be evaluated in accordance with the following criteria. The applications must be fully responsive to each of the following criteria.

Criterion 1: Technical Quality (30 points) – this criterion addresses the technical quality of the proposed research objectives that will be undertaken by the Hub. This will include but not be limited to information about:

1. The proposed physical, nuclear reactor that will be the focus of the Hub and the nuclear energy technology issues that will be addressed within the Hub. The intent of this criterion is to assess the relevance of the proposed reactor to the proposed technology issues.
2. The realism of the use of the proposed reactor for Hub activities. This will include an assessment of the agreements of the reactor owners and regulators to allow the reactor to be used in support of Hub activities.
3. The scope of the engineering oriented modeling and simulation environment that is being proposed. This should include a description of the functions that the environment is expected to provide.
4. Proposed advanced modeling and simulation capabilities that will be made available in the environment. This will include a description of existing capabilities that will be

adapted to support nuclear engineering programs. This will also include new (if any) capabilities that are proposed to be developed by the Hub.
5. Proposed middleware (if any) that will be used and/or developed to allow the interoperability of the advanced modeling and simulation capabilities.
6. How well the proposed Hub activities will support advanced educational processes that further advance the objectives of the Hub project.
7. Adequacy and appropriateness of the schedule, including sequence of project tasks.
8. Principal Hub project schedule including milestones and timeframe for major tasks; vision for the entire project with emphasis on a clear path to project completion.
9. Acceptability of planned assignment of responsibilities and level-of-resources to accelerate the current state-of-the-art energy science and technology towards its fundamental limits and produce revolutionary changes in how the United States produces and uses energy

Criterion 2: Potential for Successful Hub Execution (40 points) – this criterion addresses the approach and processes that are proposed to be used by the Hub to accomplish the research objectives described above. This will include:

1. Processes to collect requirements from expected users of the nuclear energy engineering environment. This criterion also includes the processes used to decompose and allocate the requirements and then track and test their fulfillment.
2. Software engineering and quality practices proposed to be used by the Hub.
3. Approaches for verification, validation and uncertainty quantification to ensure that modeling and simulation results can be used with confidence.
4. Management of technical risk and approach to proactive risk management and mitigation.
5. Approach to cost effectiveness/efficiency of design with advanced modeling and simulation technology development and usage.
6. Quality/credible schedule through startup to completion date.
7. Environment, safety and health and security considerations
    a. Is the approach for handling environmental, safety and health and security issues appropriate?
    b. Does the approach assure environmental compliance during Hub establishment and R&D activities?
    c. Do the lead and partner institutions have a strong history of compliance with ES&H requirements?

Preference will be given to applications that include highly collaborative and diverse teams comprised of industry, academia and, where applicable, national laboratories. This criterion addresses the team's potential to achieve Hub objectives of using science, technology, economic, and policy issues via advanced modeling and simulation. This includes regulatory acceptability, level of technology and engineering development, and the potential for future commercialization partnerships. This criterion also includes an evaluation of the interest/commitment level of industry, academia, and national laboratories, as applicable, in the proposed project through teaming arrangements, including the level and degree of participation from each of these entities to accomplish the proposed work. This criterion will also assess the broad collaborative network Hub (e.g., the "one roof" concept – either actual and/or virtual) proposed is truly synergistic and will accelerate achievement of the Hub goals; the application must clearly demonstrate that the proposed Hub will provide:

1. A clear lead institution and central location for the Hub;
2. To the extent that there is geographic distribution of the Hub participants, a clear commitment to the use of state-of-the-art technology and frequent virtual meetings to enable long distance collaboration; and

3. A clear organization and management plan for achieving the collaborative and synergistic goals of a Hub and spread a culture of empowered central research management throughout the Hub.

Criterion 3: Applicant Team Capabilities (30 points) -- This criterion addresses the approach and structure to performing the Hub as a highly collaborative team that will utilize multiple scientific, engineering and where appropriate, economic and public-policy disciplines, working largely under one roof to solve critical technology issues international collaborations. This includes the capabilities and qualifications of the proposed project manager, deputy project manager, key personnel and team members. It also includes the adequacy of resources applied by participating organizations, as well as the overall project management skills including:

1. Assessment of the proposed team capabilities to provide the expertise and experience needed to successfully implement the proposed research and tasks.
2. Assessment of applicant/team capabilities to apply existing and develop new advanced modeling and simulation capabilities to be implemented in an engineering environment and used by nuclear engineering personnel to provide predictive capability for life extension and power upgrade calculations.
3. Clear involvement of team members including potential end-users.
4. Assessment of ability to manage communications among multiple team partners and with DOE.
5. Assessment of approach to managing foreign entity participation, if any, in the project to include how Hub work will be conducted in the United States participants must comply with all U.S. laws concerning immigration, patents and technology exports.

4. Other Selection Factors

Program Policy Factors

The selection official may consider the following program policy factors in the selection process:

1. The degree to which award of the proposed project optimizes use of the available DOE funding to achieving NE program goals.
2. Benefits to the government of making awards for distinct technologies and/or approaches.
3. The extent to which the proposed project will address basic science, technology, economic, and policy issues hindering the United State's ability to become energy secure and economically strong while being good stewards of the planet by reducing green house gas emissions.
4. Reasonableness of the proposed project cost. This includes evaluation of the allocation among multiple participating team organizations where applicable, reasonableness of proposed costs for each task and overall project cost and cost-share between government and the team.
5. Extent or degree to which project funds, particularly government funds, are allocated to U.S. companies, corporations or subsidiaries for project activities performed in the United States.
6. Extent to which the planned multi-physics computational environment to be developed by the project can be used by a wide range of practitioners to conduct predictive calculations of the performance of reactors in the future, including identification of key Intellectual Property rights and how that Intellectual Property will be managed to assure commercial availability in the United States.

B. REVIEW AND SELECTION PROCESS

1. Initial Merit Review

Applications Subject to Merit Review: Applications that pass the initial Application review will be subjected to a merit review in accordance with the guidance provided in the "Department of Energy Merit Review Guide for Financial Assistance." This guide is available under Financial Assistance, Regulations and Guidance at http://www.management.energy.gov/documents/meritrev.pdf.

2. Initial Down-Selection, Site Visit/Oral Presentation

Following the initial Merit Review, the initial merit review consensus ratings will be provided to the Selection Official. Based on these ratings of each application against the Merit Review evaluation criteria, and taking into consideration the Program Policy Factors, at his/her discretion, the Selection Official will make an assessment as to which applicants are deemed the most highly rated. These may be further evaluated, at the discretion of the Selection Official and the Merit Review Team, including a site visit/oral presentation.

If the Selection Official, after complying with the above paragraph of this section, decides that an applicant should no longer be included in the down select, the application may be eliminated from further consideration for award. Written notice of this decision shall be provided to unsuccessful applicants by the Selection Official.

Applicants selected to participate in site visits/oral presentations as requested by the Government will be notified of this decision and have approximately two (2) weeks notice of the pending site visit. One (1) week prior to the site visit/oral presentation, the applicant shall provide an electronic copy of any oral presentation briefing slides to the contract specialist at minorkl@id.doe.gov .

The oral presentation from each applicant shall last no more than three (3) hours, with the site visit lasting no more than three (3) hours (for a total of six (6) hours) on a one-day time period specified by the Selection Official. It should be a oral presentation of the application, with emphasis on information pertaining to areas of applicant's capability/experience, and the technical and project approaches. The site visit/oral presentation shall be presented by the proposed principal investigator(s) of the lead team member, assisted by other key personnel identified in the proposal, if necessary. Written material or other media to supplement the oral presentations may be used but is limited to material already provided in the written application (e.g., you may elaborate or further explain already submitted written application material, but you should not present new information).

The site visit/oral presentations will provide an opportunity for dialogue among the parties. Applicants may clarify aspects of their written applications to enhance DOE's understanding and interpretation of the application. Ambiguities in the application or other concerns (e.g., perceived deficiencies, weaknesses, errors, omissions, or mistakes, prior experience, etc., may be addressed by the parties. The Merit Review team may consider information from the site visit/oral presentation in making final Merit Review ratings of applications.

This dialogue will not be used to cure application deficiencies or material omissions, materially alter the technical or cost elements of the application, and/or otherwise revise the application. DOE personnel involved in the site visit/oral presentation shall not engage in conduct that favors one applicant over another; reveals an applicant's technical approach/solution, including unique technology, innovative and unique uses of commercial items, or any information that would compromise an applicant's intellectual property to another applicant; or that reveals an applicant's proposed budget without that applicant's permission.

DOE will maintain a record (e.g., Government notes, copies of applicant briefing slides or presentation notes) of oral presentations to document what the Government relied upon in performing final Merit Review ratings.

3. Final Merit Review

Following the site visits/oral presentations, applications of applicants selected for the down select will be subjected to a final merit review in accordance with the guidance provided in the "Department of Energy Merit Review Guide for Financial Assistance." This guide is available under Financial Assistance, Regulations and Guidance at http://www.management.energy.gov/documents/meritrev.pdf.

4. Selection

Selection Official Consideration

The Selection Official will consider the merit review recommendation, program policy factors, and the amount of funds available.

5. Negotiations and Award

Government Discussions with Applicant: The Government may enter into negotiations with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR part 600; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

1. Selection and Award Date

DOE anticipates notifying applicants selected for award by June 2010 and making awards by July 2010.

Section VI - AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

1. Notice of Selection

Selected Applicants Notification

- DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Section IV.G with respect to the allowability of pre-award costs.)

Non-selected Notification

Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

2. Notice of Award

A Notice of Financial Assistance Award or Assistance Agreement issued by the contracting officer is the authorizing award document. It normally includes either as an attachment or by reference: (1) Special Terms and Conditions; (2) Applicable program regulations, if any; (3) Application as approved by DOE.; (4) DOE assistance regulations at 10 CFR Part 600; (5) National Policy Assurances To Be Incorporated As Award Terms; (6) Budget Summary; and (7) Federal Assistance Reporting Checklist, which identifies the reporting requirements.

For grants and cooperative agreements made to universities, non-profits and other entities subject to OMB Circular A-110 the Award also includes the Research Terms and Conditions located at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

1. Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR Part 600 (See: http://ecfr.gpoaccess.gov). Grants and cooperative agreements made to universities, non-profits and other entities subject to OMB Circular A-110 are subject to the Research Terms and Conditions located on the National Science Foundation web site at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp.

2. Special Terms and Conditions and National Policy Requirements

Special Terms and Conditions and National Policy Requirements. The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at http://management.energy.gov/business_doe/business_forms.htm.
The National Policy Assurances to be incorporated as award terms are located at DOE http://management.energy.gov/business_doe/business_forms.htm.

Intellectual Property Provisions: The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://www.gc.doe.gov/financial_assistance_awards.htm.

Statement of Substantial Involvement

a. DOE anticipates having substantial involvement during the project period, through technical assistance, advice, intervention, and integration with the recipient. The recipient's responsibilities are listed in paragraph b and DOE's role is listed in paragraph c.

b. Recipient's responsibilities. The recipient is responsible for:

i. Performing the activities supported by this award, including providing the required personnel, facilities, equipment, supplies and services;

ii. Defining approaches and plans, including the identification of needed research and development activities, submitting the plans to DOE for review, and incorporating DOE's comments;

iii. Managing and conducting the project activities, including coordinating with DOE management and operating (M&O) contractors, and other governmental regulatory bodies (e.g. U.S. Nuclear Regulatory Commission) on activities performed under the M&O contracts that are related to the project;

iv. Attending program review meetings and reporting project status;

v. Submitting technical reports as stated in the *Federal Assistance Reporting Checklist*, and incorporating DOE comments;

vi. Presenting the project results at appropriate technical conferences or meetings as directed by the contracting officer; and

vii. Providing quarterly project progress as well as project narratives describing the project status.

c. DOE role. DOE's role includes:

i. Reviewing in a timely manner project plans and reports and providing comments and guidance regarding the work effort;

ii. Conducting project review meetings to ensure adequate progress and that the work accomplishes the Statement of Objectives. Redirecting work or shifting work emphasis, if needed;

iii. Promoting and facilitating project activities, including disseminating project results through presentations and publications;

iv. Serving as scientific/technical liaison between the recipient and other government agencies and national laboratories,

v. Performing technical reviews to determine whether to fund the on going project phases, and

vi. Performing mutually agreed upon research and development activities.

There are limitations on recipient and DOE responsibilities and authorities in the performance of the project activities. Performance of the project activities must be within the scope of the Statement of Project Objectives, the terms and conditions of the Cooperative Agreement, and the funding and schedule constraints. The Statement of Substantial Involvement may be further negotiated by DOE and the recipient as appropriate.

C. REPORTING

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. For a sample Checklist, see http://management.energy.gov/documents/DOEF46002PolicyVersion.pdf.

Section VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions regarding the content of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. More information is available at: http://www.compusearch.com/products/FedConnect/FedConnect.asp DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

B. AGENCY CONTACT

Questions and comments concerning this FOA shall be submitted not later than 14 calendar days prior to the application due date. Questions submitted after that date may not allow the Government sufficient time to respond.

Questions Directed To:

Kelly Minor
minorkl@id.doe.gov

Section VIII - OTHER INFORMATION

A. MODIFICATIONS

Notices of any modifications to this announcement will be posted on the FedConnect portal. You can receive an email when a modification or an announcement message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other announcements.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. COMMITMENT OF PUBLIC FUNDS

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

D. PROPRIETARY APPLICATION INFORMATION

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

"The data contained in pages [*Insert pages*] of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant."

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

"The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation."

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, the Government may seek the advice of qualified non Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM

Patent Rights: The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See "Notice of Right to Request Patent Waiver" in paragraph G below.)

Rights in Technical Data. Special Protected Data Statutes. Since the anticipated award term is up to five years, DOE must have appropriate rights in data to assure long term access to generated data under this award to assure dissemination. Except for the special data protection discussed below, this can be accomplished, either through DOE ownership of and/or unlimited rights in technical data, so that DOE will have access to and the ability to direct delivery of a copy of such data first produced under the Agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as necessary to operate the Hubs or as specifically negotiated in a particular agreement to satisfy DOE's own needs or to ensure the commercialization of technology developed under a DOE agreement. This program is covered by a special protected data statute. The provisions of the statute provide for the protection from public disclosure, for a period of up to five (5) years from the development of the information, of data that would be trade secret, or commercial or financial information that is privileged or confidential, if the information had been obtained from a non-Federal party. Generally, the provision entitled, Rights in Data − Programs Covered Under Special Protected Data Statutes, (10 CFR 600 Appendix A to Subpart D), would apply, but may be modified to accommodate particular circumstances(e.g., access to or expanded use rights in protected data among consortium or team members), or to list and identify data or categories of data first produced in the performance of the award that will be made available to the public, notwithstanding the statutory authority to withhold data from public dissemination, and may also identify data that will be recognized by the parties as protected data. The same approach to data rights will apply if DOE determines it is appropriate to award a TIA .

G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER

DOE may issue a class waiver for Agreements awarded under this FOA, which DOE expects will cover most large business recipients and team members of this award. This patent waiver would provide those awardees not subject to the Bayh-Dole Act the option to retain title to their own inventions, subject to the same government retained rights identified above, provided there is cost-sharing of at least 20%, and agreement to substantially manufacture new technology created under an award resulting from this FOA in the U.S., or provide other economic benefits to the U.S. If DOE does not issue a class waiver or if applicants do not meet the criteria for the class waiver, applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this announcement, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance

of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784.
http://www.gc.doe.gov/documents/patwaivclau.pdfhttp://www.gc.doe.gov/documents/patwaivclau.pdf

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

I. PROPERTY

REAL PROPERTY. With respect to the use, management, and disposition of all real property, 10 CFR Part 600.132 shall be applicable to cooperative agreements with institutions of higher education, hospitals, and other nonprofit organizations; 10 CFR Part 600.321 shall be applicable to cooperative agreements with for-profit organizations. For DOE/NNSA contractors, the terms and conditions of the respective management and operating contract will apply. For non-DOE/NNSA FFRDC contractors and other Federal agencies, the terms and conditions of the interagency agreement will apply.

PERSONAL PROPERTY- Federally Owned and Exempt, Equipment, and Supplies and Other Expendable Property

With respect to the use, management and disposition of all personal property, 10 CFR 600.133, 134 and 135 shall be applicable to cooperative agreements, with institutions of higher learning, hospitals and non-profit organizations; and 10 CFR 600.321,322,323 and 324 shall be applicable to cooperative agreements with for-profit organizations. For DOE/NNSA contractors, the terms and conditions of the respective Management and Operating contracts will apply. For non-DOE/NNSA FFRDC contractors and other Federal agencies, the terms and conditions of the interagency agreement will apply.

J. ENVIRONMENTAL AND REGULATORY REQUIREMENTS.

DOE expects Hub establishment and R&D activities to have the same integrity and to be as state-of-the-art as the science that is expected to result from the research supported by DOE that is conducted in the Hubs. Applications to site the Hubs, therefore, should demonstrate that consideration of ES&H risks and issues is an integral component of the early planning for the Hubs. Early identification of ES&H risks and issues can alleviate problems that can affect people and the environment, as well as affect the cost, schedule and management of the Hubs from their establishment through their research operations. DOE, therefore, will consider ES&H criteria among its merit review criteria to support demonstration of early ES&H planning. This will provide an early screening of potential issues and problems, as well as provide a measure of the capability of the applicant in providing for sound ES&H planning as part of the project. DOE requires that its state-of-the-art research facilities “start clean and stay clean” with respect to ES&H.

K. ENVIRONMENTAL, SAFETY AND HEALTH (ES&H) PERFORMANCE OF WORK AT DOE FACILITIES

With respect to the performance of any portion of the work under this award which is performed at a DOE-owned or controlled site, the recipient agrees to comply with all state and federal ES&H regulations, and with all other ES&H requirements of the operator of such site. The recipient shall apply this provision to its subawardees of any tier.

L. COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

DOE will comply with the requirements of NEPA and its implementing regulations (10 CFR 1021 and 40 CFR 1500-1508) prior to taking any action on the proposed project that could have adverse environmental effects or that would limit the choice of reasonable alternatives. After selection, an environmental critique and synopsis will be prepared under 10 CFR 1021.216 to assist in developing the agreement with the institution with the preferred site for the Hub. This synopsis will be incorporated, as appropriate, into any future site-specific NEPA documentation that may be prepared to evaluate the potential environmental consequences of the proposed Hub at the preferred site provided by the Host Institution. Should an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) be required, the successful applicant will be required to interact with DOE and provide up-to-date technical details during the NEPA process.

M. AVAILABILITY OF FUNDS

Awards resulting from this Funding Opportunity Announcement are subject to the availability of appropriated funds.

Section IX - APPENDICES/REFERENCE MATERIAL

APPENDICES/REFERENCE MATERIAL

- Awardee Point of Contact Data Input Sheet
- Budget Detail Package

The following documents are provided for information purposes only; please refer to the FOA for official program information and requirements.

- Changes from draft FOA to final FOA

- Hub Questions and Answers:
  - Frequently Asked Questions
  - Pre-Workshop Submitted Questions
  - Hub Workshop Questions and Answers Summary

- Energy Innovation Hub for Modeling and Simulation Workshop, Dec 7, 2009:
  - Workshop Introduction
  - Hub Overview and Relation to Office of Nuclear Energy
  - Advanced Modeling and Simulation Needs
  - Modeling and Simulation Hub Background and Implementation
  - Competitive Process Overview
  - Path Forward - Schedule

- 2009 Workshop Report: Science Based Nuclear Energy Systems Enabled by Advanced Modeling and Simulation at the Extreme Scale - http://www.sc.doe.gov/ascr/ProgramDocuments/Docs/Nuclear%20Workshop%20Report%20.pdf
- 2006 Workshop on Simulation and Modeling and for Advanced Nuclear Energy Systems - http://www.er.doe.gov/ascr/Misc/gnep06-final.pdf